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Regional Management Strategies for Federal Offshore Borrow Areas, U.S. East and Gulf of Mexico Coasts

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ABSTRACT

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With the increased demand for Federal sand and gravel resources on the outer continental shelf, the Minerals Management Service (MMS) is developing strategies for environmentally sound and fiscally responsible management of the resource. A process is needed for planning, decisionmaking, and coordination among stakeholders. Two workshops were conducted in Texas and New Jersey to solicit input from Federal, State, and local government representatives, university researchers, and private companies on key issues. Based on the results of the workshop, it was recommended that sand management task forces be established in each state, starting with those states that can provide a strong technical and administrative lead and have a high level of interest in accessing Federal borrow sites. Sand management task forces would be responsible for planning, coordinating, and facilitating the use of OCS sand for beach nourishment and coastal restoration projects. MMS's responsibilities include taking the lead in the design and funding of long-term monitoring studies of the impacts of dredging OCS sand, sponsoring workshops on technical and policy issues, and providing a clearinghouse for dissemination of studies and findings on actual environmental impacts, focusing on key issues such as cumulative impacts.

ADDITIONAL INDEX WORDS: *OCS sand and gravel, sand resources.*

INTRODUCTION

The Minerals Management Service (MMS) sand and gravel/ marine minerals program is responsible for the environmentally responsible management of Federal Outer Continental Shelf (OCS) sand and gravel resources. MMS's mission is to make timely, streamlined, and environmentally sound and fiscally responsible decisions about access to OCS sand resources. MMS has the authority to negotiate, on a noncompetitive basis, the rights to OCS sand, gravel, and shell resources for shore protection, beach or wetlands restoration projects, or for use in construction projects funded in whole or part by or authorized by the Federal government.

Between 1995 and 2002, MMS conveyed over 19 million cubic yards of OCS sand for ten projects (DRUCKER *et al.,* this volume). MMS anticipates that, as the demand for sand for shoreline protection increases, OCS sand and gravel will become an increasingly important resource. It should be noted that projects are initiated by the beneficiaries of the resource; MMS does not propose leases for OCS sand resources.

MMS has cooperative sand evaluation programs with ten States (Alabama, Delaware, Florida, Louisiana, Maryland, New Jersey, North Carolina, South Carolina, Texas, and Virginia) to identify and evaluate OCS sand resources as potential sources for future beach nourishment projects. The program was started in 1992 in response to requests by the states to begin looking at the OCS for future sand supplies for beach nourishment. Geological task forces, consisting of members from MMS, State agencies, and other Federal agencies as appropriate, provide oversight of the program. The geological task forces conduct a thorough assessment of beach sand needs for the next 15–20 years, prioritizing the beaches in greatest need, gathering geological and geophysical information offshore of the highest-priority beaches, and determining if sufficient volumes of suitable sand are available. Benthic biological surveys and computer-generated wave modeling studies are conducted for the best sand sites to assess the potential for impacts to the benthos and coastline if the sand is removed.

MMS has contributed about $5,000,000 to the cooperative program since 1992, with the states matching that amount, mostly as in-kind contributions. Thus, the average outlay to each State has been around $50,000 per year. The status of these State inventory studies and available reports are posted on the MMS web site (www.mms.gov/offshore/).

MMS expects that some OCS sand resources will be long-term sources of borrow material for coastal erosion management because nearshore sand sources are diminishing and the renourishment cycles for beaches or coastal areas require quantities of sand that are not currently available from State sources. In addition, MMS is concerned that severe coastal storms might trigger the need for access to large sand inventories for immediate/emergency repair of beaches and coastal damage. MMS has developed guidelines for those interested in obtaining leases to develop OCS sand resources (GIORDANO *et al.,* 1999). As steward for these resources, MMS must

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ensure that any use of OCS sand resources will not adversely affect the marine, coastal, and human environments. Under the National Environmental Policy Act, an environmental assessment or impact statement (prepared by either MMS or another Federal Agency) is used to evaluate whether or not to issue a lease. MMS has taken an active role in identifying the potential environmental impacts of dredging OCS sand by conducting baseline studies of selected OCS regions and funding research on specific areas of concern. As of 2002, MMS has funded over $7 million for environmental studies. Table 1 lists the studies funded by MMS under this program; the studies are available at www.mms.gov/intermar/environmentalstudiespage.htm.

Most of the research to identify OCS sand resources has focused on bathymetric highs, described as sand shoals, ridges, and banks (see discussion on the characteristics of offshore ridges and shoals in HAYES and NAIRN, this volume). It appears that, because of their distance from shore (outside of state waters, thus greater than 4.8 kilometers offshore for most states) and water depth (typically 10–20 meters), these features appear to be isolated from the sediment budget of the littoral system by large distances and muddy areas (the latter indicating the absence of a sand transport pathway), though this will not always be the case. Their isolation from the active littoral system reduces the possibility of interrupting a sediment supply pathway to the shoreline, but it also prevents replacement of sand removed during dredging. Thus, OCS sand should be considered as a potentially nonrenewable resource that needs careful management and use.

Now, in the early stages of resource utilization, is the time to establish the mechanisms for long-term management of this resource. MMS has identified the need to involve Federal, State, and local governments and other stakeholders in an overall planning process to manage the Federal offshore borrow sites in an environmentally responsible and cost-effective manner over the long term. There are numerous jurisdictions, authorities, and consultations that must be addressed. Multiple entities may wish to access an OCS borrow site repeatedly over time, on a long-term, even continual basis, yet currently, each OCS dredging project is considered on a project-specific basis. Important objectives of the MMS program are the cost savings and value-added benefits that can be achieved through regional management, including opportunities reduce the time and costs for permitting and planning. Repeated use of sites brings up questions about potential long-term, cumulative impacts that need to be addressed, and monitoring responsibilities need to be resolved among multiple users of the resource.

STUDY APPROACH

MMS conducted a study to determine the feasibility of developing regional OCS sand management strategies; the study results (MICHEL, 2001) has been published as a MMS OCS report. The first step of the study was to identify two areas where pilot studies could be conducted to solicit input from stakeholders on how to best manage the Federal OCS sand and gravel resources. The two areas would represent different physical and biological settings, technical issues, en-

Table 1. *Environmental studies on OCS sand resource issues funded or supported by MMS.*

Site-Specific Environmental Baseline Studies
Environmental Investigation of the Use of Shoals Offshore Delaware and Maryland by Mobile Benthos and Finfish Species (Site-specific/Generic) Final Report January 2005
Field Testing of a Physical/Biological Monitoring Methodology for Offshore Dredging and Mining Operations (Generic/Site-Specific, being conducted at Sandbridge Shoal, offshore Virginia via Cooperative Agreement with VIMS). Final Report 2004
Environmental Surveys of Potential Borrow Areas Offshore Northern New Jersey and Southern New York and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. Draft report Spring 2003. Final Report Summer 2003
Environmental Survey of Potential Borrow Areas on the East Florida Shelf and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. Final Report Fall 2002
Collection of Environmental Data within Sand Resource Areas Offshore North Carolina and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. Final Report Summer 2002
Surveys of Sand Resource Areas Offshore Maryland/Delaware and the Environmental Implications of Sand Removal for Beach Restoration Projects. OCS Study MMS 2000-055
Environmental Surveys of OCS Sand Resources Offshore New Jersey. OCS Study MMS 2000-052
Environmental Survey of Identified Sand Resource Areas Offshore Alabama. OCS Study MMS 99-0052
Use of Federal Sand Resources for Beach and Coastal Restoration in New Jersey, Maryland, Delaware and Virginia. OCS Study MMS 99-0036
Environmental Studies Relative to Potential Sand Mining in the Vicinity of the City of Virginia Beach, Virginia. OCS Study MMS 97-0025
Wave Modeling/Shoreline Erosion
A Numerical Modeling Examination of the Cumulative Physical Effects of Offshore Sand Dredging for Beach Nourishment—New Jersey, Virginia, North Carolina, Florida. Final Report Winter 2001
Wave Climate and Bottom Boundary Layer Dynamics with Implications for Offshore Sand Mining and Barrier Island Replenishment, South-Central Louisiana. OCS Study MMS 2000-053
Wave Climate Modeling and Evaluation Relative to Sand Mining on Ship Shoal, Offshore LA, for Coastal and Barrier Island Restoration. OCS Study MMS 96-0059
A Methodology and Criteria to Assess the Impact of Sand Volume Removed in Federal Waters on the Offshore Wave Climate. OCS Study MMS 99-0046
Generic Studies Applicable to all Offshore Marine Mineral Efforts
Model Development or Modification for Analysis of Benthic and Surface Plume Generation and Extent During Offshore Dredging Operations. Final Report 2002
Development and Design of Biological and Physical Monitoring Protocols to Evaluate the Long-Term Impacts of Offshore Dredging Operations on the Marine Environment. OCS Report MMS 2001-089
Integrated Study of the Biological and Physical Effects of Marine Aggregate Dredging. Final Report Summer 2002
Study of the Cumulative Effects of Marine Aggregate Dredging. OCS Study MMS 99-0030
Marine Aggregate Mining Benthic and Surface Plume Study. OCS Study MMS 99-0029
Impacts and Direct Effects of Sand Dredging for Beach Renourishment on the Benthic Organisms and Geology of the West Florida Shelf. OCS Report MMS 95-0005
Marine Mining Technologies and Mitigation Techniques. A Detailed Analysis with Respect to the Mining of Specific Offshore Mineral Commodities. OCS Report MMS 95-0003
Synthesis and Analysis of Existing Information Regarding Environmental Effects of Marine Mining. OCS Report MMS 93-0006

vironmental concerns, interested parties, and agency policies on the issues. New Jersey was selected as a State with a strong beach nourishment program and nourishment projects primarily co-funded by the U.S. Army Corps of Engineers (USACE). Texas was selected as a State that was just starting a state-wide program (the 1999 Coastal Erosion Planning and Response Act) and where, historically, beach nourishment projects were funded mostly by local government agencies. Key agencies and staff in each area were identified and contacted to discuss their perspectives on what kind of management strategies would be most appropriate. The next step was to conduct a one-day workshop in each area and identify the key issues and concerns about OCS sand use. The participants in each workshop are provided in MICHEL (2001).

During the Texas workshop, it was made clear that any coordinated management effort should include both Federal OCS and State sand resources, especially since inshore sand resources will be exhausted first because of the costs of going long distances offshore. The State should take the management lead because of their authorities and ability to work locally. The first step should be development of comprehensive inventory of sand needs and sources. Without this information, there is no basis for developing management strategies. The plan should include an adaptive management approach that uses monitoring and routine re-appraisal to redirect efforts and priorities. There was a concern that the process should not become so big and cumbersome that it slows down beach nourishment projects or becomes a bureaucracy with unproductive meetings. Finally, cost sharing at the Federal, State, and local levels will be needed in all phases of data collection, monitoring, and management.

The results of the New Jersey workshop showed that an adequate base of funding provides a good support structure for successful planning. New Jersey's program has funds (provided by an additional hotel tax in coastal counties) to support dedicated staff, long-term data collection, and coordination among stakeholders. It was recognized that good geological data identifying sand sources and volumes and a sand budget identifying long-term needs are required to begin the planning process. New Jersey has developed and implemented a long-term plan for data collection, finding that task forces or working groups are effective when members have funding to work the project, are personally involved in the work, and know there is a long-term commitment to the program. Therefore, the regional management effort should be formalized through cooperative agreements. However, there is a need to integrate monitoring study results and data interpretation, so that consensus can be reached on findings, and future monitoring requirements can be modified to reflect the most current understanding of the types and duration of impacts. New understandings of impacts learned from monitoring studies need to be incorporated into resource management decisions. Therefore, long-term monitoring is required for 50-year projects because it is not possible to predict potential future impacts (see discussion of potential impacts in NAIRN *et al.,* this volume) over that period. The types of monitoring will change over time, reflecting information and understanding gained from on-going studies. It was recommended that MMS, with its broader perspective, should be the clearinghouse for environmental impact studies of OCS borrow sites.

MMS specifically considered the Regional Sediment Management (RSM) demonstration programs being conducted by the USACE. The objectives of the RSM demonstration programs are to 1) implement regional sediment management practices, 2) improve economic performance by linking projects, 3) develop new engineering techniques to optimize/conserve sediments, 4) determine bureaucratic obstacles to RSM, and 5) manage in concert with the environment (USACE, 2002). Because of their emphasis on the littoral zone, the RSM demonstration programs will not address all of the issues of concern to MMS in its charge of environmental management of OCS sand resources. OCS sand would be considered as a resource that could contribute to the sand budget along a shoreline. As the RSM demonstration programs expand, they could provide both funding and administrative resources for some of the activities that apply to both USACE and MMS objectives. In particular, increased cost effectiveness through better coordination among projects and stakeholders is a major objective of the RSM demonstration programs.

A FRAMEWORK FOR MANAGING OCS SAND RESOURCES

Based on discussions with MMS, agency representatives, and other stakeholders, it is clear that MMS needs a strategy for managing offshore sand and gravel resources in the public's trust. The question is, how should the resource be managed? There are multiple agencies with overlapping jurisdictions, differing objectives, limited staff resources, and highly variable technical skills. Decisions are not made solely on policy, technical, or economic considerations, but also include assessment of the relative importance and the magnitude of trade-offs among impacts and benefits. Not all beach nourishment projects are driven by the economics of tourist visitations or protection of private development. Sand placement on shorelines is also driven by the need to protect important coastal habitats, fishery resources, and wildlife. For example, in Texas, beach nourishment has been proposed to protect the valuable wetlands of the McFadden National Wildlife Refuge. Each State faces a different combination of issues, and resource managers strive to consider all costs and benefits.

Elements of a Regional Management Strategy

To be effective, the management strategy should be a formalized process for planning, decisionmaking, and coordination among all stakeholders. Ad-hoc committees do not have the necessary authorities. Therefore, a high level of commitment is required by each organization and the individuals assigned to participate in the process, so they are involved on a long-term basis. The organization has to provide time, funding, and recognition for participation. The management team members should be pro-active, identifying potential problems and data gaps, developing study plans and collecting data needed to address the problems, then using the results to propose and implement needed solutions and reach conclusions. There should be a mechanism for sharing of informa-

tion among stakeholders, through open meetings where issues can be raised and discussed. There needs to be a mechanism for setting goals and priorities and resolving issues through discussion, data collection and interpretation, and consensus building.

Goals and Activities for Regional Management of OCS Sand

The goals should be specific and agreed upon at the beginning of the process. MMS's goals are to avoid or minimize the environmental impacts to OCS sand borrow sites that may represent long-term sources of sand for coastal communities; reduce the time and costs to efficiently access OCS borrow sites; promote coordination among beach nourishment/coastal restoration projects to maximize cost-effectiveness; and allow for adaptive management by learning from past projects to better manage future projects. It is important to evaluate the current process for planning, implementing, and coordinating beach nourishment projects, then identify problem areas and set priorities for working on solutions.

Based on discussions with local, state, and federal stakeholders involved in beach nourishment projects, the following issues are identified as key sand management activities:

—Compile inventory of projected sand needs from all entities in the region of interest, based on analysis of the sediment budget for the total system. This analysis is critical to a state-wide assessment of the long-term sand needs and priorities.
—Compile inventory of known sand resources available, including both nearshore and offshore sand borrow sites. MMA has coordinated such studies to assess OCS sand resources through establishment of geological task forces in ten states, to assist them in this activity. This work involves new geophysical surveys, coring, and data analysis of previous offshore studies.
—Identify critical data gaps (environmental/resource) and recommend actions to address these gaps. In New Jersey, this data gap analysis has led to focused studies to inventory new potential sand sources.
—Develop guidelines for sand resource allocation (volume available versus short- and long-term needs). The objective is to preclude future "sand wars", as well as define appropriate uses of available sand resources.
—Develop and keep updated a master schedule of proposed sand dredging plans.
—Evaluate strategies for permit streamlining. There has been little work in this area.
—Develop procedures for accessing sand under emergency conditions. No work has been done in this area, to-date.
—Establish monitoring requirements and recovery endpoints.
—Develop techniques for dredging that maximize use of the site and minimize impacts, by testing different methods (*e.g.,* dredging in strips that leave undisturbed areas to promote more rapid recruitment of benthic communities).
—Identify time windows that are best/worst time for dredging to protect sensitive species.

SPECIFIC RECOMMENDATIONS FOR OCS SAND MANAGEMENT

Considering all of the information obtained during this study, the following recommendations can improve the planning process for managing OCS sand resources.

Regional management of sand resources is feasible and essential to the MMS goals for managing OCS sand resources in a cost-effective and environmentally sound manner. The expected increase in demand for OCS sand will trigger a need to manage the resource using a regional approach. Now that there are multiple potential users for sand from a single site, resource allocation becomes an issue. Frequent use raises concerns about the ability of the ecosystem to recover between dredging events, as well as long-term cumulative impacts. Coordination among users could reduce all types of costs, from mobilization to monitoring. Other Federal agencies, States, and local governments clearly look to MMS to provide leadership and guidance on both policy and technical issues associated with use of OCS sand for beach nourishment. They also expect to be active participants in decisions about any restrictions or costs associated with accessing OCS sand resources.

Generally, the "region" should consist of a single State. States differ in the types of beach erosion problems, approaches to solve them, amount of data available, level of state involvement and commitment, *etc.* It would be an added level of difficulty to engage more than one state in the process. The exception will be for specific borrow sites that straddle state lines, which would have to be handled on a case-by-case basis.

Regional management efforts should start in those States that can provide a strong State Lead and have already identified a need for OCS sand resources. MMS is limited by the small size of the sand and gravel/marine minerals program. They cannot take on the administrative burdens of coordination and logistics for each individual state that wants to use OCS sand resources. Furthermore, it would be more cost effective to work with agencies that have the resources and commitment to develop a successful approach that will be a model for future efforts. For example, the success of the early coordination efforts of the geological Task Force in New Jersey is already recognized as a model that should be followed for biological assessments there. Another factor is the degree of interest in accessing OCS sand resources. Because of the high costs of handling sand over long distances, inshore sources of sand are considered to be more economically feasible. However, there other factors that might out-weigh the cost factor, such as not interfering with the littoral transport system, environmental concerns about continual dredging in the nearshore region, and changes to wave conditions resulting from increased depths nearshore.

MMS should build on existing geological "Task Forces" in each State, letting them evolve into a State/MMS Sand Management Task Force. MMS has already established task forces or State/MMS cooperatives to collect geological data and identify promising OCS sand resources in nine states. These established relationships can be the basis for expanded responsibilities of a Sand Management Task Force (SMTF).

Compiling inventories of needs and sources is the first step in the process and needs to be completed before addressing other issues.

The relationship between the Sand Management Task Force and the USACE RSM demonstration programs will have to be addressed, depending on the stage of implementation in each region. The RSM demonstration programs presently emphasize collection of data on sediment budgets and focus on operational issues. The MMS objectives for cost effectiveness and efficiency match closely with those of RSM. There should be good cross-coordination between the two groups where they are both active.

MMS should expand its role in sponsoring and co-sponsoring workshops and developing synthesis documents and guidelines on technical and policy issues for managing offshore sand resources. MMS has already started this process with a special Sand Resources session at the January 2002 Gulf of Mexico Information Transfer Meeting. MMS could sponsor smaller, half-day or one-day meetings on specific topics where researchers involved in monitoring of the impacts of OCS sand dredging can informally discuss their results and work toward the development of findings and conclusions on the extent and duration of dredging impacts and rates of recovery of benthic communities and related biological and physical impacts (see NAIRN *et al.,* this volume). These meetings could be coordinated with other scheduled meetings or conferences. MMS could arrange for 1–2 experts to participate in the meetings, as appropriate for the selected topic.

MMS has traditionally emphasized publication of study results in peer-reviewed journals to provide scientific credibility to the study results. There should be parallel efforts to generate and disseminate in a timely manner non-peer-reviewed technical and policy documents that represent current approaches, guidelines, policies, findings, etc. MMS could take the lead on developing technical synthesis reports on the current state of knowledge on selected topics. These reports would be 2–5 page technical summaries on topics where there is general consensus on findings. Their production could be triggered by the completion of a major study, or the consensus reached at one of the smaller meetings discussed above. MMS could synthesize the guidelines developed by more advanced SMTFs and make them available on their web site as templates for use by others. This role of providing a mechanism for sharing of experience and building on previous efforts is appropriate for a Federal agency with a broader perspective and contact with multiple agencies. Through cooperative agreements, MMS can achieve significant cost effectiveness and value-added benefits, as demonstrated by the progress made in geological studies to identify and quantify OCS sand resources in the priority states.

MMS should become a clearinghouse for studies and findings on environmental impacts associated with offshore dredging relative to OCS/Federal borrow areas and use its web site to better disseminate this knowledge. MMS should take a leadership role in managing and coordinating environmental studies on the impacts of offshore dredging of OCS borrow sites. The costs of environmental monitoring of offshore areas are high, thus the study results need to be widely disseminated to all interested parties in a form that is useful to them. The NATIONAL RESEARCH COUNCIL (1990) report on Managing Troubled Waters: The Role of Marine Environmental Monitoring noted that "not only must data be gathered, but attention must also be paid to their management, synthesis, interpretation, and analysis" and "adequate resources are needed not only for data collection but also for detailed analysis and evaluation over the long term." MMS has followed these guidelines for their own studies, by producing and widely distributing reports at several technical levels (*e.g.,* executive summaries, technical summaries, non-technical summaries, detailed reports). Yet there is a need for better dissemination of all environmental monitoring data for offshore areas, and the Internet can be an effective means of accomplishing this goal. A well-designed and regularly updated MMS web site could achieve many of the MMS objectives, in terms of providing value-added benefits through sharing of information and findings among States. The MMS web site should become the best site for getting the most current, technical and policy information on offshore sand and gravel resources.

MMS should continue to play a lead role in the design and funding of long-term monitoring studies. Monitoring studies are expensive to conduct in offshore waters. There are never enough data to fully characterize all potential impacts. Of particular concern are potential long-term impacts associated with repeated dredging of a site. Therefore, monitoring programs have to be well-designed, cost-effective, and funded over long enough periods to produce definitive results. Funding is a key problem because no one agency or group has enough resources to fund monitoring programs. When there are multiple users of a site, responsibility for monitoring becomes even more complicated.

Monitoring costs need to be shared among the beneficiaries of the sand (State and local government sponsor), the managers of the resource (MMS), and other Federal agencies with an interest in the results of a monitoring effort. For instance, monitoring studies may provide valuable data for identifying essential fish habitat in the Federal OCS, thus the National Marine Fisheries Service should be involved in funding, study design, and interpretation. One of the more important functions of the State/MMS Sand Management Task Force will be to develop appropriate monitoring requirements and identify funding sources to support them. Without funds to support long-term monitoring of potential impacts, MMS will not be able to meet its responsibility to ensure that the OCS sand use does not adversely affect the marine and human environments.

MMS has already started work on improving monitoring program design. They funded a study to design a monitoring program that can be used to evaluate the potential physical and biological impacts resulting from the long-term use of OCS sand, and prepare protocols for the monitoring plan elements (MICHEL *et al.,* 2001; NAIRN *et al.,* this volume). They are cooperating with the Virginia Institute of Marine Science in a test of these protocols in 2002–2004. It should be noted that the proposed monitoring design includes post-dredging surveys at 1, 3, 5, and 7 years after the event (NAIRN *et al.,* this volume), thus monitoring may be required until impacts and recovery rates are better defined. Funding is needed not

only for data collection and analysis, but also for long-term data management, interpretation, and synthesis, so the results can be used to support resource management decisions. MMS should assist in the development of data management strategies for the wealth of environmental data for the OCS being collected as part of the monitoring programs.

SUMMARY

Regional management of Federal sand and gravel resources will allow MMS to achieve its goals of environmentally sound management coupled with cost-effective permitting, planning, operations, and monitoring. Dredging of Federal borrow sites requires coordination among a wide variety of stakeholders. Sand management task forces provide a formal process under which key issues are identified, studies are designed and implemented to address these issues, and the results are formulated into technical and policy guidelines for future projects. Although MMS is the steward of these mineral resources, it is a partner in the process to develop best-management practices for dredging projects in Federal waters.

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